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A Revision of the Genera *Chloris* and *Eustachys* in North America.

BY GEORGE V. NASH.

Most recent authors have united these two genera, and, while they do bear certain resemblances, we have come to the conclusion, after a careful examination of all the material at our disposal, that they are much better treated as genera than as two sections of one genus. The resemblances are those which are, in great part, common to all the genera of the tribe *Chlorideae*, that is, they both have one-sided spikes with the spikelets sessile and alternately arranged in two rows. These are their most marked resemblances, and, as intimated above, are not peculiar to either genus. The compressed culms and sheaths are common to both, but much more manifest in *Eustachys*. The details of the spikelet, however, present differences which seem to justify their separation. The general make-up of the spikelet is essentially the same as it is in all the related genera, but in the forms of some of its parts peculiarities appear which can be relied upon for generic distinction. It is true that in a few rare instances in *Chloris* the awn of the third scale is very short, but in the great majority of the species the awn is distinctly manifest, and in a large number of them it is very long. In *Eustachys*, on the contrary, the awn of the third scale is hardly manifest, and usually less than 1 mm. long, often but a mere point, and frequently entirely wanting. The few short-awned forms of *Chloris* can be at once distinguished from *Eustachys* by the second empty scale, which in this latter genus is broad and of approximately the same width from the base to the apex which is at least truncate, and usually 2-toothed or 2-lobed and distinctly awned. In *Chloris* both the empty scales are lanceolate or narrowly ovate, hence with the sides converging at the acute or acuminate apex, and in a few species the midnerve is continued as a short point. In all the material examined this distinctive character of the second scale is constant, and this, in the case of *Eustachys*, in conjunction with the more flattened culms and sheaths and the strongly equitant character of the latter at the base of the culms, together with the absence of the awn in the third scale, or, when present, its

extreme shortness, appear to us to warrant the maintenance of *Eustachys* as distinct from *Chloris*. In general appearance the two groups are readily distinguishable, thus adding confirmatory evidence to the technical characters above alluded to.

In North America, the distribution of the two genera is markedly different. *Chloris*, with the exception of one species, *C. barbata*, does not occur native east of the Mississippi River. This one exception is in southern peninsular Florida and is a West Indian plant which is also found in South America. *Eustachys*, on the other hand, with one exception, *E. petraea*, is not indigenous west of the Mississippi, but is mainly confined to the southeastern United States. *E. petraea* extends as far west as Texas, and much beyond the limits of North America. *Chloris* appears to be abundant in the southwestern United States and Mexico, and probably southward into South America, while *Eustachys*, as stated above, is mainly confined, in the United States, to the southeastern portion, and is particularly partial to Florida, all four species being found in that State, two of them not known outside its borders, and one species, *E. Floridana*, extending just beyond the line into Georgia. The fourth species, *E. petraea*, as stated, has a wider range, extending from Florida along the Gulf Coast to Texas, and thence through Central America to South America; also in the West Indies and the Bahamas.

Descriptions follow of the two genera with the species under them and their distribution, so far as known, at the present time. In order that the knowledge of this distribution may be extended and better defined, additional herbarium material would be highly prized, and the hope is expressed that those having such material to spare will send it to the author, who will gladly determine it.

The material, upon which the results obtained in this paper are based, is contained in the herbaria of the New York Botanical Garden, Columbia University, and the Division of Agrostology, at Washington, D. C., and also in the author's own private collection. The material from the herbarium of the Division of Agrostology, kindly loaned for examination by Prof. Scribner, has been of especial value and has greatly aided us in this revision, as it is particularly rich in forms from Texas and the adjacent country, in which region the genus *Chloris* is largely represented.

CHLORIS Sw. Prod. 25. 1788.

Tufted annual or perennial sometimes glaucous grasses with round or more or less compressed smooth and glabrous culms and sheaths, flat or folded obtuse or acute leaves, and terminal inflorescence composed of erect or spreading 1-sided spikes arranged usually in a terminal whorl, or sometimes with the addition of a whorl or two, or of several scattered spikes, very rarely single. Spikelets alternately arranged in 2 rows on one side of a triangular rachis and more or less divergent from it. Scales 4-9, the awns hispidulous; outer 2 scales empty, membranous, keeled, 1-nerved, the nerve hispidulous, the first scale acute, shorter than the second which is acute or acuminate and sometimes awn-pointed; third scale firmer, chartaceous, keeled, 3-nerved, the nerves usually more or less pilose, or rarely the midnerve glabrous or hispidulous only, awned, the awn usually manifest, sometimes very long, the scale enclosing a perfect flower and a 2-nerved palet as long as the scale or a little shorter, the nerves ciliate; fourth scale of various and characteristic shapes, similar in texture to the third, awned, from acute to truncate at the summit which is usually inrolled, 3-7-nerved, generally empty, rarely enclosing a shorter palet and flower; the remaining scales successively smaller and empty. Stamens 3. Styles distinct; stigmas plumose. Grain free, linear to elliptic, nearly round or 3-sided.

A genus of about 40 species, widely distributed in all warm or tropical regions, excepting those of Europe. Some of the species are cultivated for ornament, but none appear to be of economic value or importance.

In general appearance the species bear much resemblance to each other, but the technical characters separating them, while confined to small organs and requiring careful dissection, are wonderfully constant. In several closely related species the fourth scale has been found to be of great importance. Its shape and particularly the formation of the apex have proved of especial value. The venation of this scale has also furnished characters for separating species of close affinities. While usually 3-nerved, it is sometimes 5- or 7-nerved above the middle by the branching of the lateral nerves at that place, the branches being sometimes faint but readily discernible on close inspection.

The genus has two fairly marked groups, one with the base of the slender racemes naked or furnished with but few scattered

spikelets, the other with the spikelets crowded to the very base of the stouter and usually shorter racemes. The essential and diagnostic details of the two groups will be found in the following key :

Key to the Species.

Spikes slender, usually naked at the base or with a few scattered spikelets.

Mid-nerve of the third scale not pilose, but hispidulous above the middle.

1. *C. Nealleyi*.

Nerves of the third scale all pilose.

Apex of the elliptic fourth scale acute.

2. *C. tenuispica*.

Apex of the obovate-cuneate fourth scale obliquely truncate.

3. *C. verticillata*.

Spikes stout, spikelet-bearing to the base.

Hairs on the nerves of the third scale short, .5 mm. or less long, not manifest and not extending beyond the apex of the scale.

Fourth scale obovate-cuneate, 3-nerved, .6 mm. wide, the apex unequally rounded.

4. *C. brevispica*.

Fourth scale obcuneate or triangular, 5-nerved, 1 mm. or a little more broad.

5. *C. latisquamea*.

Fourth scale broadly triangular, 7-nerved, wider than long.

6. *C. cucullata*.

Hairs on the lateral nerves of the third scale long, 1 mm. or more in length, manifest and decidedly extending beyond the apex of the scale.

Hairs on the lateral nerves of the third scale about equal in length.

Hairs exceeding the apex of the scale, about 1 mm. long ; fourth scale 1 mm. wide ; upper surface of the leaves glabrous.

7. *C. Texana*.

Hairs much exceeding the apex of the scale, 2-3 mm. long ; fourth scale .5 mm. wide ; upper surface of the leaves near the base usually long-hairy.

8. *C. barbata*.

Hairs on the lateral nerves of the third scale unequal in length, those at the summit much longer.

Scales 4, rarely 5 ; third scale one third as broad as long, the terminal hairs on the lateral nerves 2.5-3 mm. long.

9. *C. elegans*.

Scales 7-9, the upper ones much reduced ; third scale one sixth as broad as long, the terminal hairs on the lateral nerves about 1 mm. long.

10. *C. Prieuri*.

1. CHLORIS NEALLEYI nom. nov.

Chloris Texensis Nash, Bull. Torr. Bot. Club, **23**: 151. 1896.
Not *C. ciliata* var. *Texana* Vasey. 1890.

Culms 3-6 dm. tall, compressed, tufted, simple, or branched at the base, erect ; nodes 2 : culm leaves about 2 ; sheaths usually longer than the internodes, smooth, compressed, keeled ; ligule a scarious ciliolate ring about .5 mm. broad ; blades 2.5-15 cm. long, 3-5 mm. wide, smooth beneath, rough above and on the margins : inflorescence exserted ; spikes 5-8, 10-18 cm. long,

pilose at the base which is naked or with a few scattered spikelets : spikelets, exclusive of the awns, about 4 mm. long : scales 4 ; outer empty scales often purplish, acuminate, the first scale three fourths as long as the second which is about 3.5 mm. long ; third scale, exclusive of the awn, 4 mm. long, in side view equilateral and .8 mm. wide, acute, the internerves rough, especially above the middle, the callus pilose, the lateral nerves pilose above the middle, the hairs increasing in length toward the apex, the midnerve hispidulous above the middle, the awn inserted just below the apex, 6-9 mm. long, the palet as long as the scale ; fourth scale 2-2.5 mm. long, in side view elliptic and about .5 mm. wide, the apex acute, the lateral nerves glabrous, the midnerve hispidulous above the middle, the awn inserted just below the apex, 4-5 mm. long.

Texas. Collected by both G. C. Nealley and F. W. Thurow, and apparently only by them. The larger third and fourth scales, together with the glabrous midnerve of the former and the different shape of the latter, readily separate this from *C. verticillata* Nutt. The collection by Mr. Nealley is taken as the type.

2. CHLORIS TENUISPICA sp. nov.

Culms 2-4 dm. tall, erect, tufted, compressed, simple or somewhat branched at the base, the innovations about one half as long as the culms ; nodes 3 or 4 : culm leaves 3 or 4 ; sheaths overlapping, compressed, keeled ; ligule a scarious ciliate ring about 1 mm. wide ; blades 4-15 cm. long, 2-3 mm. wide, linear, abruptly acute, smooth beneath and often with a few scattered hairs arising from papillae, rough above and on the margins : inflorescence with the axis 2 cm. or less long, angled, the angles hispidulous ; spikes 10-12, 6-10 cm. long, finally widely spreading, in about two whorls, very slender, pilose at the base, which is naked or with a few scattered spikelets : spikelets, exclusive of the awns, about 3 mm. long ; scales usually 4, sometimes 5, the outer empty ones narrow, acuminate, awn-pointed, the first scale about three fourths as long as the second, which is 3-3.5 mm. long ; third scale with the callus pilose, about 3 mm. long, in side view elliptic, equilateral and .7 mm. wide, the lateral nerves pilose their entire length, the midnerve to the base of the awn, which is inserted just below the acute apex and is 4-6 mm. long, the palet slightly shorter than the scale ; fourth scale sparingly pilose on the midnerve only, occasionally enclosing a perfect flower (and in this case the scale a little larger than usual), similar to the third, though smaller, usually empty, somewhat inequilateral in side view, the margins

more curved than the midnerve, which is almost straight, the lateral nerves but little more curved than the midnerve, 1.75–2 mm. long, in side view about .5 mm. wide, acute at the apex, the awn inserted just below the apex, 2.5–4 mm. long; fifth scale, when present, less than 1 mm. long with an awn shorter than itself.

Texas. Resembles in general appearance and in its outer empty scales *C. verticillata*, but its narrower leaves, very slender spikes, and the acutish and not truncate fourth scale readily distinguish it. The fourth scale occasionally bearing a flower and maturing seed is a character not noted in any other species. It is at once known from *C. Nealleyi* by the smaller third scale with its pilose midnerve.

The type material was collected by Mr. G. C. Nealley in 1889. It was also secured by him the following year. Mr. S. B. Buckley collected it in 1883, and Mr. J. G. Smith secured it at Alice, on June 7, 1897, no. 4.

3. *CHLORIS VERTICILLATA* Nutt. Trans. Am. Phil. Soc. II. 5:
150. 1833–37.

Culms 2–5 dm. tall, compressed, at first erect, at length decumbent at the base and rooting at the lower nodes, simple or somewhat branched; nodes of the erect part of the culm 1–4: leaves 1–several; sheaths compressed, keeled, overlapping, a few long hairs on each side at the apex, the uppermost one much elongated; ligule a scarious ciliolate ring about .5 mm. wide; blades 1.5–18 cm., usually less than 8 cm., long, 2–4 dm. broad, smooth beneath, rough above and on the margins, linear, obtuse: inflorescence at length exserted, the axis .5–5 cm., usually 2–3 cm., long, angled, the angles hispidulous; spikes 8–21, commonly exceeding 12, 5–15 cm. long, generally more than 10 cm., pilose at the base which is usually naked or with a few scattered spikelets, at length widely spreading, arranged in 1–4 whorls, or the upper ones scattered or approximate, the rachis hispidulous on the back: spikelets, exclusive of the awns, about 3 mm. long: scales 4, with rarely the minute rudiment of a fifth scale; outer empty scales acuminate, awn-pointed, the first scale from two thirds to three fourths as long as the second which is about 3 mm. long; third scale pilose on the callus, 2.5–2.75 mm. long, in side view nearly equilateral and .8 mm. wide, the lateral nerves pilose their entire length with short hairs, the midnerve as far as the awn, which is inserted just below the apex and is 5–8 mm. long, the palet as long as the scale; fourth scale 1.5–2 mm. long, in side view obovate-

cuneate and about .75 mm. wide, inequilateral, the midnerve straight, the lateral nerves much curved, the apex obliquely truncate with the marginal corner rounded, thus making the extranervial portion crescent-shaped, the awn inserted at or just below the apex, 4-5 mm. long.

Sandy soil, Arkansas to Kansas, south to Texas. In the herbarium of Columbia University is preserved a specimen of Nuttall's collection in Arkansas.

The following are to be referred here :

Kansas: Ulysses, C. H. Thompson, June 27, 1893, no. 55.

Indian Territory: Between Fort Cobb and Fort Arbuckle, Palmer, 1868, no. 396. Sapulpa, B. F. Bush, June 19, 1894, no. 779; Redfork, June 21, no. 780; Claremore, Sept. 18, no. 783.

Oklahoma: M. A. Carlton, June, 1891, no. 210. Stillwater, J. Hayes Bone, 1896, no. 30.

Texas: Dallas, J. Reverchon, June, no. 3440**.

4. CHLORIS BREVISPICA sp. nov.

Chloris verticillata var. *intermedia* Vasey; L. H. Dewey, Contr. U. S. Nat. Herb. 2: 528. In part. 1894. Not *C. intermedia* A. Rich. 1851.

Culms 1-2 dm. tall, compressed, decumbent at the base, at length somewhat branching; nodes 2 or 3: culm leaves 2 or 3; sheaths compressed, shorter than the internodes, keeled; ligule a scarious ciliolate ring less than 1 mm. long; blades 1-6 cm. long, 1-3 mm. wide, erect or ascending, smooth beneath, rough above and on the margins: inflorescence consisting of 6-10 finally spreading spikes, spikelet-bearing to the base, 2.5-4.5 cm. long: spikelets, exclusive of the awns, about 2.8 mm. long; scales 4; outer empty ones lanceolate, acute, usually tinged with purple, the first scale a little more than one half as long as the second which is about 2 mm. long; third scale 2.5 mm. long, in side view about equilateral, elliptic and about .75 mm. wide, the callus pilose, the midnerve sparingly pilose with short hairs to the awn, the lateral nerves more copiously nearly to the apex, the hairs about .5 mm. long, the awn inserted a little below the apex, about 2 mm. long, the palet equaling the scale; fourth scale obovate-cuneate, about 1.5 mm. long, in side view about .6 mm. wide, the midnerve almost straight, the lateral nerves considerably curved, the apex unequally rounded, the extranervial portion crescent-shaped, the awn inserted below the apex, 1.4-1.8 mm. long.

Sandy soil, Texas. Readily distinguished from *C. verticillata* by its shorter and less numerous spikes, broader empty scales, shorter awns, and smaller and differently shaped fourth scale.

The following specimens belong here :

G. C. Nealley, 1885; Hockley, F. W. Thurow, 1891; Nueces Co., A. A. Heller, 1894, Mar. 21, no. 1471 (the type), and Gregory, April 14, no. 1579.

5. *CHLORIS LATISQUAMEA* nom. nov.

Chloris verticillata var. *intermedia* Vasey; L. H. Dewey, Contr. U. S. Nat. Herb. 2: 528. In part. 1894. Not *C. intermedia* A. Rich. 1851.

Culms 2-6 dm. tall, compressed, simple at first, finally branched at the decumbent base and rooting at the lower nodes; nodes 2 or 3: culm leaves 2 or 3; sheaths usually much shorter than the internodes, compressed, keeled; ligule a scarious ciliate ring less than 1 mm. wide; blades 1-10 cm. long, 2-4 mm. wide, linear, obtuse, rough on both surfaces and on the margins; inflorescence exserted, the axis 1.5 cm. or less long, angled, the angles hispidulous; spikes 10-16, 3-7 cm. long, finally widely spreading and often more or less flexuous, spikelet-bearing to the base: spikelets, exclusive of the awns, 2.3-2.8 mm. long; scales 4; outer empty ones acute, the first scale about one half as long as the second, which is about 2 mm. long; third scale 2.2-2.7 mm. long, in side view elliptic and .8-.9 mm. broad, about equilateral, the callus pilose, the lateral nerves strongly pilose their entire length with short hairs, the midnerve less so to the base of the awn, which is inserted just below the apex and is 1.5-3 mm. long, the palet about as long as the scale; fourth scale 1.5-1.7 mm. long, in side view obcuneate or rarely triangular and 1-1.2 mm. broad, 3-nerved, the midnerve straight, the lateral nerves much curved, branching at the middle, thus making the scale appear 5-nerved at the truncate apex, the extranervial portion triangular, .5 mm. wide, the awn inserted just below the apex, 1.5-2 mm. long.

Dry ground and shady river banks, Texas. Distinguished from *C. verticillata* by the shorter spikes, shorter and broader outer empty scales, and the broader and more nerved fourth scale; the different shape and the much greater width of this latter organ, together with its much more spreading awn, also serving to separate it from *C. brevispica*, to which it is closely related.

The following specimens are referred here :

Houston, Elihu Hall, April 20, 1872, no. 773; San Diego, Miss Mary B. Croft, 1884, no. 60a; Del Rio, G. C. Nealley, 1892; Fort Clark, Kinney Co., Edgar A. Mearns, 1892, Dec. 3, no. 1233, and 1893, April 29, no. 1424; A. A. Heller, 1894, Gregory, San Patricio Co., April 14, no. 1580, and Kerrville, Kerr Co., May 14-21, no. 1767 (the type); Kerrville, J. G. Smith, June 21, 1897.

The *C. verticillata* var. *intermedia* of Vasey, judging from what we take to be the original material, comprises two well-marked forms. This material is in the National Herbarium and consists of three sheets on which are written, presumably in the handwriting of Dr. Vasey, these words: "Intermediate between *cucullata* and *verticillata*." No definite indication of what was considered the type occurs on any one of the sheets and in fact a varietal name is not indicated. The plants on one of the sheets above referred to were collected by F. W. Thurow, at Hockley, Texas, in 1891, and belong to the preceding species. The other two sheets, the specimens of which were collected, on one by G. C. Nealley, in Texas, and on the other by Elihu Hall, at Houston, in the same state, in 1872, no. 773, have been referred here. Dr. Vasey, so far as can be ascertained, never published such a variety himself. Mr. L. H. Dewey, however, as indicated in the synonymy above, did publish a variety *intermedia* and accredited its authorship to Vasey, but as this is invalidated by the *C. intermedia* of A. Richard, as previously shown in the synonymy, the lack of definite information as to just what is the type loses much of its importance. On account of this impossibility of identifying the type of the variety, we have thought it best, in order that authentic material of what we have above designated as *C. latisquamea* may be accessible to a large number of herbaria, to take as the type of this new species material from some large collection which is widely distributed, not only in this country, but also in Europe. Mr. A. A. Heller's no. 1767, collected at Kerrville, Kerr Co., Texas, May 14-21, 1894, seems best to serve this purpose.

6. CHLORIS CUCULLATA Bisch. Ann. Sci. Nat. III. 19: 357. 1853.

Chloris verticillata var. *aristulata* Torr. Pac. R. R. Surv. Pope's Rep. 2: Bot. 176. 1855.

Culms 2-7 dm. tall, compressed, erect, or later decumbent at the base and rooting at the lower nodes; nodes of the erect culm 2 or 3: culm leaves 2 or 3; sheaths compressed, keeled, loosely embracing the culm, much shorter than the internodes, usually rough on the keel; ligule a scarious ring 1 mm. or less broad; blades 2-15 cm. long, 3 mm. or less wide, erect or nearly so, flat, or folded when dry, very rough on both surfaces: inflorescence consisting of 6-15 spikes, usually 8-10, 2-4 cm. long, often flexuous, widely spreading, spikelet-bearing to the base: spikelets, exclusive of the awns, 1.7-2 mm. long, triangular, about as broad as long: scales 4; first scale acute, one half to three fifths as long as the second which is 1.5-1.75 mm. long and broader above the middle; third scale 1.7-2 mm. long, in side view elliptic and about .9 mm. wide, nearly equilateral, obtuse, the callus pilose, the lateral nerves densely pilose their entire length with short hairs about .4 mm. long, the midnerve sparingly so, the awn inserted just below the apex, .5-1 mm. long, the palet about as long as the scale; fourth scale about 1 mm. long, in side view broadly triangular and 1.3 mm. broad, the midnerve slightly curved, the lateral nerves branching twice, making the scale appear 7-nerved above, the awn inserted just below the apex .2-.3 mm. long: seed elliptic, about 1.3 mm. long, finely striate.

Sandy soil, Texas. At once distinguished from all other species by its very broad 7-nerved fourth scale.

The following specimens are referred to this species:

Lindheimer, 1847, no. 730. Austin, Elihu Hall, 1872, no. 776. Upper Brazos, J. Reverchon, Sept., 1879, no. 1148; also at Seymour, Sept., no. 3440*. San Diego, Miss Mary B. Croft, 1884, no. 60. Laredo, C. G. Pringle, July 24, 1889, no. 2405. Austin, J. E. Bodin, Sept., 1891, no. 292. Corpus Christi, Nueces Co., A. A. Heller, March 14-21, 1894, no. 1449. R. T. Hill, 1895, no. 86.

7. CHLORIS TEXANA (Vasey).

Chloris ciliata var. *Texana* Vasey, Bull. U. S. Dept. Agric. Div. Bot. 12¹: 30. 1890.

Culms 2.5-6 dm. tall, simple, slender, compressed; nodes about 3: culm leaves about 3; sheaths much shorter than the internodes, coarsely striate; ligule a scarious ciliate ring about .5 mm. broad; blades 6-20 cm. long, 3-6 mm. wide, flat, ascending, rough on the margins and toward the apex on the lower surface, otherwise smooth: inflorescence finally exserted; spikes 3-6, 4-8

cm. long, erect or nearly so, spikelet-bearing to the base: spikelets, exclusive of the awns, about 2.8 mm. long: scales 6; outer empty ones very acute, pointed, the first scale about three fifths as long as the second, which is 2.5–3 mm. long; third scale, with the callus pilose, about 2.7 mm. long, in side view inequilateral and 1 mm. broad, the margin much more curved than the midnerve, the nerves pilose with hairs about 1 mm. long, which extend beyond the apex of the scale, the lateral nerves except at the base and the apex, the midnerve up to the awn, which is inserted just below the apex and is about 1.5 mm. long, the palet about as long as the scale; fourth scale about 1.7 mm. long, in side view obovate-cuneate and 1 mm. wide at the truncate and obscurely crenulate apex, 3-nerved, the midnerve almost straight, the lateral nerves much curved, the extranervial portion broadly triangular, the awn inserted just below the apex, 1–1.25 mm. long, the palet about three-fifths as long, narrow, the nerves ciliolate; fifth scale similar to the fourth, 1 mm. long, in side view .8 mm. wide; sixth scale about .5 mm. long.

Southern Texas. Apparently collected only by G. C. Nealley at Brownsville in 1889. Occurs also in the West Indies. Ricksecker's no. 42, collected at St. Croix, D. W. Indies, on Nov. 4, 1895, belongs here.

This, as indicated above, has been considered a variety of *C. ciliata* Sw., but according to our conception of that species, based upon the descriptions of its author, this must be quite different. In the original place of publication of *C. ciliata*,* Swartz does not give a very extended description, and if this were the only source from which to draw the result would be rather dubious, but in his subsequent work on the flora of the West Indies† a much longer and more definite description is given, with a reference to the first place of publication. In this latter work the sheaths are said to be villous at the throat, and the third scale with an awn twice its length and the hairs as long as the scale. In *C. Texana*, as will be noted above, the ligule is a mere ciliolate scarious ring which could hardly be called villous under any conception of that term, and the third scale has the awn much shorter than itself and the hairs longer than the scale. What the *C. ciliata* of Swartz is we do not know, no material that could be prop-

* Prod. 25. 1788.

† Fl. Ind. Occ. 1: 197. 1797.

erly referred there having come under our observation. About the name which we have adopted for this plant, *C. Texana*, there can be no doubt as the type has been seen.

8. CHLORIS BARBATA (L.).

Andropogon barbatum L. Amoen. Acad. **5**: 412. 1759. Not of Mant. 302. 1767.

Andropogon polydactylon L. Sp. Pl. 1483. 1763. [Ed. 2.]

Chloris polydactyla Sw. Prod. 26. 1788.

Culms 5–10 dm. tall, round or slightly flattened; nodes 3 or 4; culm leaves 3 or 4; sheaths striate, the lower ones overlapping, the upper shorter than the internodes; ligule a scarious ciliate ring about 1 mm. broad; blades 6 dm. or less long, 1 cm. or less wide, attenuate into a long slender point, smooth on both surfaces, rough on the margins, usually densely pilose on the upper surface at the base, just above the ligule, with hairs 3–4 mm. long; inflorescence at length long-exserted; spikes 6–25, usually a dozen or more, flexuous and more or less spreading, 5–15 cm. long, commonly more than 10 cm.: spikelets, exclusive of the awns, about 3 mm. long; scales 6; outer empty ones acuminate, the first scale about three fourths as long as the second (which is about 3 mm. long) and broader; third scale, with the callus short-pilose, about 2.25 mm. long, in side view inequilaterally elliptic and about .75 mm. wide, the nearly straight midnerve much less curved than the lateral nerves, all the nerves pilose, the midnerve to above the middle with hairs about .5 mm. long, the lateral nerves from below the middle to the apex with intermixed hairs of irregular length 2–3 mm. long, the hairs extending much beyond the apex of the scale, the brown awn inserted just below the summit, 3–4 mm. long, the palet about as long as the scale; fourth scale about 1.3 mm. long, in side view obovate-elliptic and about .5 mm. wide, obliquely truncate at the crenulate apex, the brown awn inserted just below the summit, 2.5–3 mm. long; fifth scale triangular, a little more than one half as long as the fourth; sixth scale about one half as long as the fifth; grain elliptic, about 1 mm. long.

South peninsular Florida. Also in the West Indies and South America. Collected in this country, so far as indicated by the material at our disposal, only by Mr. J. H. Simpson.

A word in regard to the history of the name of this plant may be of interest. Linnaeus in the *Amoenitates Academicae*,* in an article on the plants of Jamaica, published an *Andropogon barbatum*

*5: 412. 1759.

giving a fairly long description and the following citation : "Brown, jam. 364." We have not access to the work cited by him, but from the description there can be little doubt as to what plant he had in view. In a later work, however, he throws more light upon the subject in the publication of his *Andropogon polydactylon*,† citing as synonymous his previous publication in the *Amoenitates*, further elucidating the matter by again referring to "Brown, jam. 364," and adding a positive means of identification in his additional reference to "Sloan, jam. 33, hist. 1, p. 111, t. 65, f. 2." This plate and description have been seen by us, and there is no doubt as to the figure representing what has long been called *Chloris polydactylon* Sw., the long leaves and the elongated flexuous spikes, characteristic of this species, being well indicated.

An examination of the above facts will show that Linnaeus included in the publication of his *Andropogon polydactylon* a reference to his previous publication of *Andropogon barbatus*, with its reference to the work on Jamaica by Brown, thus fully establishing the fact of the identity of the two plants, and as confirmatory evidence offers the plate in Sloan's History of Jamaica which, as stated above, well represents the *Chloris polydactyla* Sw. It would seem from this that a clear case is established for the adoption of the name *barbatus* for this species, as it antedates the other by four years.

Just why Linnaeus should have proceeded in this apparently careless manner is not clear. A hint as to where he secured the name *polydactylon* is given in the words he cites in the second edition of his *Species Plantarum* : "*Andropogon polydactylon* assurgens, spicis tenuioribus hirsutis. Brown, jam. 364." Why he should thus ignore the earlier publication of *Andropogon barbatus* and substitute for the specific name that of *polydactylon*, we must repeat, is not clear. Possibly he thought that *polydactylon* was a better descriptive term, as the numerous long spikes of the plant are very striking.

Subsequent to the publication of his *Andropogon polydactylon*, Linnaeus again published an *Andropogon barbatus*,* giving its

† Sp. Pl. Ed. 2: 1483. 1763.

* Mant. 302. 1767.

habitat as the East Indies, but making no reference whatever to the publication of his first species of this name. This, of course, makes this subsequently published name a homonym, and necessitates securing another name for the East Indian plant, a result which can probably be attained by delving among the mass of little understood names in this genus.

9. *CHLORIS ELEGANS* H.B.K. Nov. Gen. & Sp. Pl. 1 : 166, *pl.* 49. 1815.

Culms 1.5–9 dm. tall, compressed, erect, finally branched ; nodes 2–4 : culm leaves 2–4 ; sheaths compressed, keeled, much shorter than the internodes, loosely embracing the culm, the uppermost one much enlarged at the time of protrusion of the inflorescence ; ligule a scarious ciliolate ring 1 mm. or less wide ; blades 1–20 cm. long, usually less than 10 cm., 2–6 mm. wide, erect or ascending, smooth beneath, usually very rough above : inflorescence yellowish or silvery white, often tinged with purple, consisting of 3–12, commonly 8–10, erect spikes, 2–8 cm. long : spikelets, exclusive of the awns, about 4 mm. long, long-hairy at the base : scales 4, or occasionally 5 ; outer empty ones lanceolate, often purplish, acuminate, the first scale about three fifths as long as the second which is about 3 mm. long and bears just below the apex an awn about 1 mm. long ; third scale, exclusive of the awn, 3–3.5 mm. long, pilose on the callus, in side view equilateral and about 1 mm. wide, the midnerve abruptly contracted a short distance below the awn, glabrous or more or less pilose with short hairs except at the summit, the marginal nerves nearly equally curved, short pilose below the middle, long pilose at the summit with erect hairs 2.5–3 mm. long, which much exceed the apex of the scale, the internerves below the middle and near the midnerve sometimes sparingly appressed-pubescent, the awn inserted just below the summit, 5–10 mm. long, the palet about as long as the scale ; fourth scale 1.5–2.5 mm. long, in side view about .6 mm. wide and obcuneate to oblong-cuneate, obliquely truncate at the apex, the midnerve nearly straight or a little curved, the lateral nerves curved from about the middle to the apex, the awn inserted just below the summit, 3–7 mm. long ; fifth scale, when present, triangular, less than 1 mm. long : seed elliptic, 1.75 mm. long.

Sandy soil. Texas to Arizona, south to Central America.

The following, among many specimens examined, are to be referred here :

New Mexico : C. Wright, 1851–2, nos. 2026 and 2027.

Arizona : J. T. Rothrock, 1874, no. 578. Gardiner's Spring, C. G. Pringle, June 24, 1882. Fort Huachuca, T. E. Wilcox, 1891, no. 79. Tucson, J. W. Toumey, Aug. 25, 1891, no. 150.

Mexico : Chihuahua, C. G. Pringle, Sept. 20, 1885, no. 474.

10. CHLORIS PRIEURI Kth. Enum. Pl. 1 : 266. 1833.

Culms 4-10 dm. tall, at first erect, finally decumbent at the base and rooting at the lower nodes ; nodes 4-6 : culm leaves 4-6 ; sheaths shorter than the internodes, keeled, at least toward the summit, smooth, papillose-hirsute on both margins at the summit, otherwise glabrous ; ligule a scarious ciliolate ring, about .5 mm. broad ; blades 1.5 dm. or less long, 3-6 mm. wide, smooth beneath, rough above and on the margins, the upper surface papillose-hirsute toward the base with long hairs : inflorescence at length exserted ; spikes 4-15, 6-9 cm. long, erect, the rachis strongly hispid, especially on the angles : spikelets, exclusive of the awns, about 4 mm. long : scales 7-9, the upper ones much the smaller, the uppermost scale often reduced to a mere awn ; outer empty scales acuminate, awn-pointed, the first about one half as long as the second, which is 2.5-3 mm. long ; third scale, exclusive of the awn, 3-3.5 mm. long, in side view narrowly oblong and about .5 mm. broad, acute, the callus short-pilose, a row of dark glands on each side of the glabrous midnerve, the lateral nerves glabrous below the middle, pilose above, the hairs increasing in length toward the summit, where they are about 1 mm. long, the awn inserted just below the apex, 8-15 mm. long, the palet shorter than the scale, gland-bearing between the nerves ; remainder of the scales much reduced in size, sometimes mere rudiments, the awns successively shorter.

Introduced at Wilmington, N. C., and on ballast at Mobile, Ala., collected at the former place by Mr. G. McCarthy, and at the latter locality by Dr. Chas. Mohr.

EUSTACHYS Desv. Nouv. Bull. Soc. Philom. 2 : 188. 1810.

[SCHULTESIA Spreng. Pl. Pugill. 2 : 17. 1815.]

Tufted perennial sometimes glaucous grasses with much compressed smooth and glabrous culms and sheaths, the former often 2-edged, the latter crowded at the base of the culm and strongly equitant, leaves flat, or, when dry, folded, obtuse, and a terminal inflorescence composed of erect or ascending 1-sided spikes, digitately arranged in 1 or occasionally in 2 whorls, or rarely reduced to 1 or 2 spikes. Spikelets alternately arranged in 2 rows on one

side of a triangular rachis and more or less divergent from it. Scales 4, or very rarely 5, the fifth rudimentary, the awns, when present, hispidulous; outer 2 scales empty, membranous, keeled. 1-nerved, the nerve hispidulous, the first scale acute or acutish, shorter than the awned second, which is broad and oblong, 2-toothed or 2-lobed, or sometimes truncate, at the apex; third scale firmer, chartaceous and deep brown or almost black at maturity, keeled, 3-nerved, the nerves pilose, awnless or bearing a mere rudimentary awn, enclosing a perfect flower and a 2-nerved palet as long as or a little shorter than the scale, the nerves ciliolate; fourth scale similar in texture to the third, awnless or rarely short-awned, rounded to truncate at the apex, which is inrolled on the margins, 3-nerved, the nerves glabrous. Stamens 3. Styles distinct; stigmas plumose. Grain free, elliptic.

Species about 10, confined to the tropics and the warmer parts of the temperate zones in America.

Key to the Species.

Spikelets 2 mm. long; third and fourth scales awnless, or the former with a mere dorsal point.

Spikes usually 4-6, rarely more; second scale of the spikelet manifestly 2-toothed at the apex; leaves usually 3-7 mm. wide. 1. *E. petraea*.

Spikes 10-25; second scale of the spikelet truncate at the apex; leaves usually 1 cm. or more wide. 2. *E. glauca*.

Spikelets 3 mm. or more long; third and fourth scales awned.

Spikes usually 1 or 2, rarely 3; third scale of the spikelet exceeding 3 mm. long. 3. *E. floridana*.

Spikes 4-6; third scale of the spikelet less than 3 mm. long.

4. *E. neglecta*.

1. EUSTACHYS PETRAEA (Sw.) Desv. Nuov. Bull. Soc. Philom.
2: 189. 1810.

Chloris petraea Sw. Prod. 25. 1788.

Chloris Swartziana Doell, Mart. Fl. Bras. 2³: 68. 1883.

Culms 3-11 dm. tall, much compressed, at length branched, often decumbent or prostrate at the base and rooting at the lower nodes; nodes 2-5: basal leaves crowded, culm leaves 2-4 at the lower nodes; sheaths much compressed, keeled, striate, those at the base and lower nodes equitant; ligule a scarious ciliolate ring less than .5 mm. wide; blades 3 dm. or less long, usually under 2 dm., 10 mm. or less wide, commonly 6 mm. or under, smooth on both surfaces, rough on the margins: inflorescence at length much exserted, consisting of 3-11, usually 4-6, erect or slightly spreading spikes, 4-11 cm. long: spikelets about 2 mm. long:

scales 4; outer empty ones broad, the first scale acute, from one half to three fourths as long as the second, which, exclusive of the awn, is 1.5–1.75 mm. long, oblong, more or less hispidulous on the exterior surface, 2-toothed at the apex, the teeth triangular, acute or obtusish, the awn about .5 mm. long; third scale, with the callus pilose, about 2 mm. long, in side view elliptic and about 1 mm. wide, nearly equilateral, the midnerve a little more curved than the lateral nerves, all the nerves pilose with hairs about .3 mm. long, the lateral nerves from just below the middle to the apex, the midnerve excepting at the base and the summit, the awn a mere point, or wanting, the palet about as long as the scale; fourth scale 1.3–1.5 mm. long, in side view obovate-elliptic, .5–.7 mm. wide, rounded at the apex, awnless.

Dry sandy soil, usually along the coast, North Carolina to Florida, west to Texas. Also in Cuba and the Bahamas and in Central and South America. In Florida it occurs in the heart of the peninsula, 50 miles from the coast.

The following specimens are to be referred here :

Texas : Corpus Christi, H. W. Ravenel, Apr. 30, 1869, no.

86. Hempstead, Elihu Hall, Apr. 18, 1872, no. 775.

Florida : A. H. Curtiss, Jacksonville, May, no. 3443; June 12, 1893, no. 4060; and Aug. 23, 1894, no. 4808. Eustis, Lake Co., Geo. V. Nash, March 12–31, 1894, no. 217.

Bahama Islands : Fortune Island, Eggers, no. 3860.

Cuba : C. Wright, no. 3817.

2. EUSTACHYS GLAUCA Chapm. Fl. South. U. S. 557. 1860.

Chloris glauca Vasey, Descrip. Cat. Grasses U. S. 61. 1885.

Culms 6–15 dm. tall, much compressed, sometimes sparingly branched, usually simple; nodes 2–4: basal leaves 6–12, culm leaves 2–4 at each of the nodes, excepting the uppermost one; sheaths much compressed, equitant, keeled, broadest at the base, striate; ligule a scarious ciliolate ring about .5 mm. wide; blades 2.5 dm. or less long, 1.5 cm. or less wide, linear, rounded at the apex, smooth on both surfaces, rough on the margins, the uppermost one wanting or less than 1 cm. long; inflorescence finally long-exserted, the axis 2.5 cm. or less long; spikes 10–25, erect or somewhat spreading, 6–15 cm. long; spikelets about 2 mm. long; scales 4; first scale boat-shaped, acute, about one half as long as the second, which, exclusive of the awn, is 1.5 mm. long, oblong, in side view about .3 mm. wide, minutely and irregularly toothed at the truncate apex, hispidulous on the outer sur-

face, the awn about .3 mm. long; third scale 1.75–2 mm. long, in side view about equilateral, ovate, .8–.9 mm. wide, obtuse at the awnless apex, the nerves hispid above the middle, the hairs shorter toward the apex of the scale, the palet about as long as the scale; fourth scale about 1.3 mm. long, in side view oblong and about .5 mm. wide, rounded-truncate at the awnless apex.

Brackish marshes and along cypress swamps, Florida.

The following belong here :

Jacksonville, A. H. Curtiss, Sept., no. 3444; Sept. 23, 1893, no. 4059, and Sept. 18, 1894, no. 5186. Eustis, Lake Co., Geo. V. Nash, July 1–10, 1895, no. 2139.

3. EUSTACHYS FLORIDANA Chapm. Fl. South. U. S. 557. 1860.

Chloris Floridana Vasey, Descrip. Cat. Grasses U. S. 61. 1885.

Culms 4–10 dm. tall, erect, simple, much compressed; nodes 2: culm leaves 2; sheaths much compressed, keeled, much shorter than the internodes, those at the base short and crowded, the uppermost one elongated; ligule a scarious ciliolate ring about .5 mm. broad; blades folded, at least when dry, erect, rough on the margins, smooth on both surfaces, acute, the early basal ones 1–3 dm. long, 4–8 mm. wide, those on the culm 2–7 cm. long, 5 mm. or less wide, the terminal one minute or wanting: inflorescence long-exserted, consisting of 1–3, usually 2, rarely 3, erect spikes, 5–10 cm. long: spikelets, exclusive of the awns, 3–3.5 mm. long: scales 4; first scale obtuse or acutish, about two thirds as long as the second, which is about 2.5 mm. long, exclusive of the awn, minutely pubescent on the outer surface, unequally 2-lobed at the apex, the lobes rounded and minutely and irregularly toothed, the awn .7–1 mm. long; third scale, with the callus pilose, 3–3.5 mm. long, in side view nearly equilateral and 1–1.2 mm. wide, elliptic, the midnerve with a slight depression near the apex, the marginal nerves more curved, all the nerves pubescent with ascending hairs about .5 mm. long, the lateral nerves excepting at the base, the midnerve except at the apex, the awn .5–.7 mm. long, inserted just below the apex, the palet about as long as the scale; fourth scale 1.5–2.5 mm. long, in side view nearly oblong, a little broader at the rounded-truncate summit, 1 mm. wide, 3-nerved, the awn inserted just below the apex, less than .5 mm. long: seed obtusely 3-angled, about 2.3 mm. long.

Dry sandy soil, southern Georgia and northern Florida.

The following belong here :

Georgia: Bainbridge, Chapman.

Florida : Lake City, Columbia Co., Geo. V. Nash, July 11-19, 1895, no. 2198. Chattahoochee, S. M. Tracy, Aug. 23, 1897, no. 3730.

4. EUSTACHYS NEGLECTA.

Chloris neglecta Nash, Bull. Torr. Bot. Club, 22 : 423. 1895.

Culms 7-12 dm. tall, erect, simple, much compressed ; nodes 3 : basal leaves 6-12, culm leaves usually 1 at each node, sometimes 2 at the lower node ; sheaths much compressed, keeled, striate, the basal equitant ; ligule a scarious ciliolate ring about .5 mm. broad ; blades folded, at least when dry, 2 dm. or less long, 9 mm. or less wide, linear, obtuse, smooth on both surfaces, rough on the margins, the uppermost wanting or very small : inflorescence at length much exserted, the axis less than 1 cm. long ; spikes 4-6, erect or slightly spreading : spikelets, exclusive of the awns, about 3 mm. long : scales 4, rarely 5 ; first scale obscurely 2-lobed at the apex, awn-pointed between the lobes, a little broader than, and about two thirds as long as, the second, which, exclusive of the awn, is about 2.5 mm. long, oblong, sparsely pubescent exteriorly, 2-lobed at the apex, the lobes obtuse and minutely and irregularly toothed, the awn about 1 mm. long ; third scale, with the callus pilose, 2.5-2.8 mm. long, in side view about 1 mm. wide and a little inequilateral, the margin more curved than the midnerve, the nerves pilose with hairs about .7 mm. long, the lateral nerves excepting at the base, the midnerve to the base of the awn, which is about 1 mm. long, the palet slightly shorter than the scale ; fourth scale 1.5-2 mm. long, in side view obovate-elliptic and about .75 mm. wide, the awn inserted below the summit, less than 1 mm. long ; fifth scale, when present, triangular, less than .5 mm. long : seed 3-angled, elliptic, about 1.5 mm. long.

Dry sandy soil, east and peninsular Florida. The type of this species was collected by the writer near Orange Bend, Lake Co., in 1895, no. 2149. The greater number of spikes, the smaller spikelets, and the shorter third scale with its longer hairs at once distinguish this from the above, *E. Floridana*, to which, in general appearance, it bears much resemblance.

The following belong here :

Jacksonville, A. H. Curtiss, 1875. Duval Co., bank of St. John's river, A. Fredholm, Oct. 9, 1893, no. 319. Eustis, Lake Co., Geo. V. Nash, July 1-10, 1895, no. 2149 (the type).